Appendix II

GLOSSARY

Airbrake--system of braking in which the braking mechanism is actuated by air pressure.

Airgap--air-filled gap in a magnetic or electric circuit in a dynamo or motor; the space between the field magnetic poles and the armature.

Alternating current--electrical power system in which the electrical current flow goes first in one direction then the other, giving rise to the term "alternating."

Ampere--unit which indicates the rate of flow of electric current.

Arc--the visible flow of electric current between conducting pieces separated by air or other gases.

Armature--usually refers to the rotating part of a direct current generator or motor; also that part of a contactor or relay caused to move by magnetic force.

Atmospheric pressure--pressure of the atmosphere measured from absolute zero pressure. At sea level atmospheric pressure is about 14.7 pounds per square inch, decreasing as the altitude increases.

Auxiliary generator--generator of electric power to be used for driving the auxiliary equipment of diesel motive power.

Axle--shaft of wrought iron or steel to which a pair of wheels is attached by pressing on with a hydraulic wheel press.

Babbitt metal--alloy, consisting mainly of tin and copper, largely used for journal box bearings; so called after its inventor, Isaac Babbitt. Any white alloy for bearings, as distinguished from the metals, or brasses, in which copper predominates.

Bands--wrapping of high tensile strength wire around the armature of a generator or motor to hold the coils or other parts in place against the centrifugal forces of rotation.

Brakeshoe--cast-iron piece held against a wheel to produce braking.

Brush--device used for pressing against a rotating part of a generator or motor in order to pass current from the stationary to the rotating portions, or vice versa. Usually made of carbon, or graphite.

Burning--commonly substituted for combusion; for example, late burning means late or slow combustion.

Bushing--lining for a hole. Usually a metal cylindrical ring which forms a bearing for some other object as a shaft, valve, etc., inserted into the hole. Often contracted to bush.

Bypass--form of valve manually or automatically controlled which, when open, permits a fluid to pass around some part of a mechanism.

Cam--wheellike disk attached to a shaft. Only a portion is circular, the remainder protruding beyond the circle. From the irregularity or the contour of the cam, corresponding motion is imparted to a valve by means of a lifter, push rod, and rocker arm.

Camshaft--shaft which carries the various cams required for the operation of intake and exhaust valves.

Carbon--one of the nonmetallic elements. In a prepared form, it may be a brush or electrode.

Carbon pile--group of carbon disks so arranged that by compressing a stack of these disks, the electrical resistance from one end of the stack to the other is reduced. When the pressure on the stack is reduced, the resistance rises. One means of obtaining a variable resistance.

Circuit--course followed by an electric current passing from its source through a succession of conductors and then returning to its place of origin.

Clearance--space provided between moving parts or between a moving part and a fixed part of objects.

Clearance volume--volume of air space remaining in the cylinder when the piston has reached the end of its upward or compression stroke.

Coil--successive turns of insulated wire which create a magnetic field when an electric current passes through.

Combustion--result of the combination of a combustible with oxygen. The process is usually initiated by heat and produces heat. (See Burning.)

Combustion chamber--compartment in a locomotive cylinder where combustion occurs.

Combustion knock--explosion that occurs when a cylinder is filled with fuel before ignition begins.

Commutating field--auxiliary flux developed at the point where the armature coils are short circuited by the brush. Used to eliminate excessive sparking by helping reverse the current in each short-circuited coil.

Commutating pole--steel pole piece with a coil for producing a commutating magnetic field.

Commutator--device used to reverse the direction of electric currents in any circuit.

Compound field winding--combination of series, shunt, and/or separately excited field coils for magnetizing a field pole.

Compression--pressure produced within a cylinder as the piston moves from bottom to top center with all valves closed.

Compression ignition--ignition of a fuel charge by the heat generated by compression of the air in a cylinder.

Compressor governor--device used to regulate the point at which an air compressor cuts in (loading point) and when it cuts off (unloading point).

Conductor--any device, wire, bar, or material which readily conducts electrical current.

Contactor--device for making or breaking an electrical circuit and usually actuated by the pull of magnetism. In its usual form, it consists of a stationary coil surrounding a steel core and an armature moved by magnetism of the core whenever an electric current flows through the coil. The armature carries a moving contact piece which strikes and completes an electrical circuit

through a stationary contact piece. While a relay may accomplish this same function similarly, the term contactor is usually applied where the currents passing through the contact pieces are of appreciable values.

Controller--device, usually manually operated, by which the operator of a locomotive can increase or decrease the applied power, make transition, and determine direction.

Crankcase--lower part of the engine structure in which the crankshaft is mounted.

Crankpin--that part of the crankshaft that is offset to carry the connecting rod.

Crankshaft--shaft that extends through the length of the engine to which is attached the connecting rods and which gathers the power and delivers it to the flywheel.

Cumulative field winding--on a single magnetic circuit encircled by series, shunt, and/or separately excited coils, if all coils tend to magnetize the circuit in the same direction, the windings are said to be cumulative.

Current--flow of electric energy in a circuit. (See Ampere.)

Cycle--complete series of events which occur until the original positions of all moving parts are restored and recurrence starts. In the four-stroke-cycle engine, this requires four strokes of the piston, hence the designation; in the two-stroke-cycle engine, only two strokes are needed to complete the cycle.

Cylinder--cylindrical part of an engine in which the piston moves.

Cylinder cock--small cock screwed into a cylinder to allow any accumulation of water in the cylinder to escape.

Cylinder head--part which covers and seals the end of a cylinder and usually contains the valves.

Differential control--system of control whereby the loading of the diesel engine is regulated by a differential field winding applied to the main generator or to the exciter of the main generator.

Differential field winding--in a combination of series, shunt, and/or separately excited field coils, an arrangement such as one tending to magnetize the field pole in a direction opposite to the magnetization of the others.

Direct current--electrical power system in which the electrical current flow is continuously in the same direction.

Drum--cylindrical device carrying contact plates and so arranged that by its rotation circuit changes are made.

Dynamo--machine used to generate electricity or force; can be either a motor or a generator.

Eddy current--local circulating current generated in conductors or machine structures, usually serving no useful purpose.

End windings--that portion of the armature coils of a generator or motor which extends beyond the armature iron at either end.

Energize--to apply electrical voltage to a circuit, coil, or other device.

Engine--mechanism for converting the energy in steam, air, or other gas under pressure into mechanical energy in the form of motion. Usually restricted to reciprocating engines having a cylinder, reciprocating piston, and means for causing the gas under pressure to expand alternately on each side of the piston, moving it back and forth in the cylinder. Frequently used as meaning the entire locomotive.

Equalizer--beam connected at each end to a driving or truck spring, or the end of another similar beam, for the purpose of distributing the weight of an engine to two or more axles, and to prevent an excessive load being thrown upon one axle by reason of inequalities of the track or roadbed. Also known as equalizing lever or beam, or equal beam.

Excite--to pass current through a coil for the purpose of creating a magnetic field.

Exciter--generator especially designed to produce the electric current required for exciting another generator.

Exhaust pyrometer--instrument to measure temperature of the exhaust by the electrical energy developed at the junction of two dissimilar metals when exposed to heat.

Expansion period--portion of the power stroke during which the combustion gases exert pressure on the moving piston and expand while the pressure falls.

Field--region where magnetic forces act; also known as the magnetic field.

Foot-pounds (ft-lb)--units in which work is measured; equivalent to the work of raising 1 pound vertically a distance of 1 foot or of moving an object 1 foot against a resistance of 1 pound.

Four-stroke cycle--engine in which the intake, compression, power, and exhaust events are completed with four strokes of the piston. In a normal engine, this is accomplished within two revolutions of the crankshaft.

Fulcrum--in mechanics, that by which a lever is sustained or the point on which it moves.

Fuse--fusible link connected in a circuit so that when an excessive current flows, the link will melt and break the electrical circuit.

Generator--machine that transforms mechanical energy into electrical energy.

Governor--on an engine, a device whereby the speed is held approximately constant regardless of the load or is kept from exceeding a set predetermined speed within the limits of the engine, brought about by the governor altering the amount of fuel introduced into the cylinder.

Ground--connection from an electrical circuit to a grounded part.

Heat balance--tabulation showing the percentage of the heat developed by combustion in an engine cylinder, that is: delivered in the form of power at the crankshaft; lost in friction; lost to the cooling water; lost in the exhaust gases and radiation.

Horsepower--rate of doing work expressed in terms of 33,000 foot-pounds per minute. This means if a weight of 33,000 pounds was raised 1 foot in 1 minute there would have been one

horsepower of work done, or if 1 pound was raised 33,000 feet in 1 minute, it would also be one horsepower.

Inertia--resistance of a body to motion or change in velocity.

Injection pump--a pump used to inject fuel into the injector.

Injector--mechanism that inserts fuel into the combustion chamber.

Insulation--material which does not readily pass electric current. An assembly of materials and devices for insulating a circuit.

Interlock--secondary electrical contact-making or contact-breaking device applied to a contactor or switch for altering the control circuits depending upon whether the switch is open or closed.

Interpole--commutating pole.

Journal--in reference to a crankshaft, that part resting in the main bearing shells.

Journal bearing--block of metal, usually some kind of brass or bronze, which is in contact with a journal on which the load rests. In locomotive building, usually means an engine or truck axle journal bearing.

Journal box--castiron, malleable iron, or cast steel box which encloses the journal of a truck axle and the journal bearing and key, and which holds the packing for lubricating the journal. Also called axle box, grease box, housing box, oil box, and pedestal box, or, simply, box.

Jumper--removable electrical connector usually used for bypassing a portion of an electrical circuit. Also a device used between units of a train for coupling or uncoupling electrical circuits carried from unit to unit.

Kilowatt--unit of power; 1,000 watts; 1.34 horsepower.

Knife switch--switch consisting of one or more bare hinged blades, making contact edgewise with stationary jaws.

Lateral motion--movement sidewise; in railroading, a side or swing motion of the bolster of a swing bolster truck, as opposed to the end play of an axle under the journal.

Lead--conductor leading current to or from an electrical device. Usually applied to flexible wire, cable, etc.

Liner--inner removable part of a cylinder in contact with the piston.

Load--a term indicating output of the engine.

Load control--system of control whereby the loading of a diesel engine is regulated by the speed of the engine itself, this speed reflecting the load conditions of the engine.

Lubrication--use of oil, grease, or other substance between moving parts of machinery for reducing friction, resistance, and heating caused by motion of the parts in contact.

Lubricator--any device, as an oil cup or grease cup, for holding a lubricant and supplying it to wearing surfaces.

Magnetic field--normally the region where magnetic forces are acting.

Magnetic flux--average field intensity of a magnet, multiplied by its area.

Magnetic line of force--invisible line indicating the direction of action of a magnetic force.

Mean--another way of saying average. The mean effective pressure of any engine is the average pressure in the cylinder during the power stroke, for example.

Mechanical efficiency--ratio of useful work performed by a machine to the energy expended in producing this work.

Mechanical injection--same as airless injection; an injection system of a diesel engine that does not use air as a means of carrying the fuel into the combustion chamber.

Megger--instrument used for the measurement of insulation resistance. Since such resistance to the passage of electric current is generally in the range of millions of ohms (megohms) the instrument derives its name therefrom.

Megohm--large unit of resistance; a million ohms.

Motor--an electrical machine having electrical conductors rotating past magnetic poles so that electrical energy may be converted into mechanical energy.

Muffler--sometimes referred to as silencer; used to diminish noise of either the intake or the exhaust.

Multiple--as pertaining to electricity, designating a circuit having a number of conductors in parallel. As applied to engines, the operation of more than one motive power unit simultaneously by one operator.

Needle valve--rod consisting of a long fine point to its spindle, the point just fitting into a hole which its motion opens or closes. Needle valves are designed for standard working pressures to control air, gas, gasoline, or other liquids requiring close regulation.

Negative--usually considered the relative potential toward which electric current flows.

Neutral--that zone on the commutator of a generator or motor where the voltage between bars is at minimum. This zone is normally stationary in respect to the field poles even though the commutator is rotating.

Nitrogen--gas that makes up approximately four-fifths of the atmospheric air.

Nozzle--device containing one or more small openings through which liquids or gases are ejected under pressure.

Ohm--unit of electric resistance. An electric conductor is said to have a resistance of one ohm if a current of one ampere flows when one volt is impressed across the conductor.

Ohm's law--relationship between voltage, resistance, and current formulated by Ohm: $I = \frac{E}{R}$.

Overload--excess of current in a circuit, prevented by fuses and circuit breakers.

Oxygen--ordorless, colorless, tasteless gas which makes up 20 percent of the atmosphere and is necessary to support life and combustion.

Packing--material used to seal a joint against leakage or as a method to apply lubricant to a bearing or bearings.

Parallel--side by side. A method of connecting an electric system in which all of the positive poles or terminals are connected to one conductor and all of the negative poles to another conductor.

Piston--cylindrical part of an engine which reciprocates in the cylinder bore and transmits the force exerted upon its crown to the connecting rod and crank.

Piston crown--the top of the piston.

Piston pin--pin which rests in two bored holes in the piston and passes through the eye of the connecting rod to join the two together flexibly.

Piston pin bearing--bearing either in the eye of the connecting rod or in the bored bosses of the piston in which the piston pin oscillates.

Piston rings--rings of cast iron, which float in grooves of the piston, to seal against gas leakage between the piston and cylinder barrel.

Plunger--piston of a pump, such as a fuel injection pump.

Pole--usually a projection of steel provided with a coil for producing magnetism in a motor or generator; a conductor or lead of a circuit acted upon by a switch.

Pole piece--steel portion of a magnetic pole.

Positive--usually considered the relative potential from which electric current flows.

Pressure charging--method of putting more air and more fuel into the cylinder--increasing the engine's power.

Receptacle--usually a stationary device housing electric terminals so arranged that electric connections may be made to these terminals by inserting a plug or jumper head. Normally used for connecting external circuits to a locomotive or rail car for battery charging or for multiple operation of motive power units.

Regulator--automatic or hand-operated device whose function is to regulate the voltage of a circuit or the output of a given machine, or to maintain other conditions within prescribed limits.

Relay--electric device which operates under one set of predetermined electric conditions in other parts of the circuit or other electric circuits. Relays may be of various types, the title usually being indicative of their functions, such as voltage relay, reverse current relay, transition relay, overload relay, regulating relay, etc.

Relief valve--valve, similar to a safety valve, that opens at a predetermined pressure.

Residual magnetism--magnetic effect retained by iron or steel after the magnetizing force used to magnetize the metal is removed.

Resistance--property of a conductor or material which opposes the flow of current when voltage is applied and which converts electric energy into heat. The unit of resistance is the ohm.

Resistor--assembly of conductors having relatively high resistance characteristics built to connect in a circuit as desired to limit or control the current flow.

Reverser--control device, usually of the drum type, used for altering the electric connections of traction motors to obtain reverse movement of a motive power unit.

Rheostat--resistor arranged for convenient variation of the resistance value.

Ring grooves--grooves cut in a piston to hold the piston rings.

Rod, connecting--rod which transmits the reciprocating motion of a piston to the circular motion of a crank.

Rpm--revolutions per minute.

Sand box--receptacle for carrying sand to be used to prevent slipping of the driving wheels; operated by a pneumatic sander which allows sand to run through the sand pipes to the rail in front of the drivers; located beneath the running boards or under the engine hood.

Saturation--total amount of magnetic force that can be permanently imparted to the core of a magnet.

Scavenging--exhaust of burned gases after combustion.

Seal--any method used to prevent leakage.

Series circuit--connection of two or more pieces of electric apparatus in succession so that the flow of current is first through one and then through the others in turn. For instance, if two motors are connected in series with a source of power, current flows through No. 1 motor and then through No. 2 motor before returning to its source.

Series field--field winding connected in series with the armature of the machine itself or in series with the armature of a main generator.

Series motor--type of motor in which the field coils are connected in series with the motor armature. This motor is self-protecting to some extent since a rise in current through the armature is accompanied by the same rise in the field. Since motor torque depends upon armature current and field strength, a relatively small rise in current results in a large increase in torque.

Shaft--moving member of an engine, supported by bearings and intended to transmit rotary motion.

Short-circuit--to short a circuit means to introduce a relatively low resistance path in place of the normal higher resistance path. A short circuit usually refers to an accidental and possibly a damaging bypassing of such normal circuit resistance.

Short field--arrangement of a traction motor field whereby the number of turns connected in the circuit may be reduced to weaken the field strength; tends to increase the motor speed.

Shunt--(1) device for diverting a portion of the current from a part of an electric circuit. (2) piece of electric apparatus used in connection with a meter or instrument so that the main current passes through the shunt with only a small portion passing through the meteror instrument. (3) to shunt a portion of an electric circuit means to shunt around it; usually applied to the field of a traction motor.

Shunt field--field of a motor or generator energized by being connected directly between the positive and the negative terminals of the machine.

Shunted field--field around which a shunt has been connected to divert a portion of the current normally passing through the field; usually for the purpose of increasing traction motor speed.

Skirt, piston--lower cylindrical portion of a piston.

Sludge--tarlike formation in oil resulting from mixing of oxidized oil with water and dirt.

Solenoid--electric coil, usually of many turns, used for the generation of a magnetic flux.

Specific gravity--(1) weight of solid or liquid as compared with equal volume of pure water at 62° F. (2) weight of a gas as compared with equal volume of air under the same condition.

Steam generator--small boiler used to convert water to low-pressure steam for heating purposes.

Steel--compound of iron usually with small quantities of silicon and manganese and containing between 1/2 and 3 percent carbon. Steel, unlike wrought iron, can be tempered and retains magnetism. Its malleability decreases and fusibility increases with an increase in carbon.

Stroke, piston--distance that a piston moves from one end of its path to the other end.

Supercharging, or pressure charging--supplying of combustion air to an engine at higher than atmospheric pressure; usually 3 to 5 pounds per square inch but as high as 30 pounds in some types of engines.

Switch--device for opening and closing an electric circuit. Its name usually describes its construction or purpose, such as knife, toggle, pneumatic, magnetic, battery, cutout, or selector switch.

Tachometer--instrument for indicating rotative speed in terms of revolutions per minute.

Thermal efficiency--ratio of heat transformed into work to the total heat supplied.

Thermocouple--strips of dissimilar metals joined, usually welded, at one end. When heated at the joint, a small amount of

electrical energy is generated in proportion to the temperature, and these currents, when measured by a millivoltmeter with its scale graduated in degrees, indicate temperature.

Thermostat--control mechanism whose operation is dependent upon the expansion of heated metal or fluid which is converted into movement and force. This in turn actuates devices that control electric circuits, valves, etc., and can be set to operate at definite temperatures.

Throttle--mechanism used on a diesel-electric locomotive in conjunction with the governor which determines the amount of fuel injected into the cylinders and the power and speed developed.

Torque--usually expressed in foot-pounds, torque is the twisting or turning force developed by the rotating shaft of an engine or motor. The pressure or twisting force of a wrench on a nut is also called torque and is expressed in foot-pounds.

Torque control--first system of load control wherein the engine is loaded to its full permissible torque by gaging the rise or fall in engine speed. A control generator reflects engine speed and causes a load regulator to operate to increase the electrical load if the engine speed is high and vice versa.

Traction motor--electric motor that drives an individual axle of a locomotive.

Tractive effort--expressed in pounds, it is the horizontal power or pull that a locomotive can exert if the wheels do not slip.

Tractive force--force exerted at the rims of the driving wheels of a motive power unit for propulsion.

Tractive power--power developed at the rims of the drivers of a motive power unit. Frequently misused to mean tractive force. Tractive power involves both traction and speed, whereas tractive force may be independent of speed.

Trainline--electric circuits passing from one vehicle to another of a train.

Transfer pump--any pump employed to transfer liquids from one area to another.

Transition--change from one system of electric connections to another. Usually applied to the change from series connection of traction motors to parallel connection.

Truck--metal frame carrying journal boxes and supported on one or more pairs of wheels with their axles, mounted under a locomotive, and carrying part of the weight of the locomotive. With the exception of a few designs of rigid trailing trucks, all trucks are made to turn about a central pivot or to allow for side displacement to enable the locomotive to round sharp curves.

Two cycle (properly two-stroke cycle)--engine operating method utilizing a regularly repeated series, or cycle, of events, each cycle completed in two strokes of the piston, providing a power impulse per cylinder for each shaft revolution. One stroke includes the last part of the scavenging and all of the compression phases; the other, expansion, exhaust, and the early part of the scavenging period.

Unit switch--pneumatically operated switch for use in the main power circuits of railway vehicles.

Valve, spray--valve which sprays the fuel charge injected into the engine cylinder.

Vanes--baffles employed to deflect currents of air or gas.

Viscosity--resistance to flow, measured by a number of systems (Saybolt-Furol, Saybolt-Universal, Engler, etc.) and rated by the number of seconds required for a definite quantity to flow through a standard orifice under stated test conditions.

Viscosity index--number given to a certain lubricating oil to indicate the oil's performance under certain temperature variations.

Volt--unit used in measuring electric pressure.

Waste--threads of wool, cotton, and vegetable fiber used to hold lubricating oil and to come in contact with parts to be lubricated; sometimes called packing or dope.

Water jacket--outer metalic casting forming a space around cylinder liners to permit the passage of water for cooling purposes.

Watt--unit of electric power; equals one volt multiplied by one ampere. To determine the power of a circuit, multiply the volts across the circuit by the amperes flowing (in direct current circuits). 746 watts equals one horsepower.

Wheel--circular disk, mounted on an axle, serving to support a moving vehicle. Wheels used on railroad equipment are sometimes made of chilled cast iron but more commonly of wrought steel.

Wheel flange--projecting edge or rim of the periphery of a wheel for keeping it on the rail.